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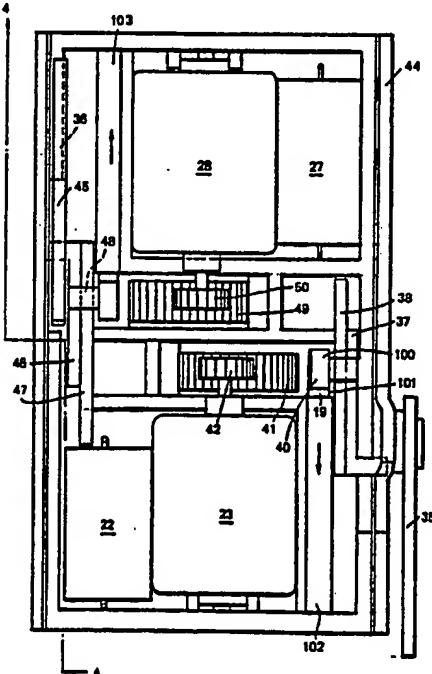
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(54) Title: DOOR LOCKING SYSTEMS FOR MOTOR VEHICLES



(57) Abstract

Door locking apparatus for a motor vehicle of the type that works by disconnecting the outside door handle from the latch mechanism to prevent entry into the vehicle, includes means whereby the innermost handle may also be disconnected from the latch mechanism.

DOOR LOCKING SYSTEMS FOR MOTOR VEHICLES

This invention relates to door locking systems for motor vehicles.

Central locking systems are known in which all the doors of a vehicle can be locked and unlocked simultaneously by a single locking or unlocking operation, usually carried out on a lock fitted to the outside of the driver's door of the vehicle. Some systems lock each door of the vehicle by immobilising the actual latch mechanism fitted on each door.

It is known from EP-A-142319 (the disclosure of which is incorporated merely by this reference) to provide such a door locking apparatus comprising an outermost handle operatively connected to the latch mechanism of the door, and electrically operable drive means for engaging and disengaging the outer handle from the latch mechanism.

In this way the door cannot be opened from the outside when the car is locked because the handle is disengaged from the latch. A problem arises in that unauthorized entry can still be made to

the vehicle by breaking a window and operating the handle on the inside of the door.

It is one object of the invention to provide a system which overcomes these disadvantages. Accordingly the invention as defined above includes an inside door handle operatively connected to the latch mechanism and is characterised by further electrically operable drive means for engaging and disengaging the innermost handle from the latch mechanism.

Preferably the apparatus includes first electrical switch means operable from the outside of the door, whereby a user can render the inside and the outside door handles operative and inoperative, and further electrical switch means locatable in the vehicle whereby the outside handle and/or the inside handle can be rendered operative and inoperative. Most preferably the further electrical switch means are arranged whereby the outside handle can be rendered operative and inoperative while the inside handle remains operative. The locking system can be arranged so that the locking systems on all the doors can be actuated simultaneously by the first and further electrical switch means.

In a preferred aspect of the invention there is provided, for each door of the vehicle, apparatus comprising a pair of links, one connected to the outside handle of the door and one to a

latch pawl forming part of the latching mechanism; a member movable into and out of engagement with the two links to connect them together or to leave them free for relative movement; first electrical drive means comprising a motor or solenoid for actuating said connecting member characterised by a second pair of links, a second connecting member and second electrical drive means for controlling the connection between the inside handle of the door and the latch pawl; and an electrical circuit arranged to energise all the electrical drive means from a switch operable from outside the door to immobilise the inner and outer handles, the circuit including an inside switch which immobilises only the outer handle without energising the electrical drive means which controls the second pair of links of the inside handle.

Preferably one or both sets of links comprise elongate bar-like members arranged side-by-side and each displaceable in the direction of their length, holes extending transversely across each member, the connecting member comprising a pin which in the disengaged condition is arranged to be withdrawn from one or both of the holes, whereby the bar members are free for relative movement, and in the engaged condition is arranged to engage both of the holes whereby both of the members move together.

In order that the invention may be more readily understood, it will now be described, by way of example only, with reference to

the accompanying drawings, in which:

Figure 1 is an electrical circuit diagram;

Figure 2 illustrates schematically a part of a known type of door latch mechanism for a motor vehicle;

Figure 3 is a view of a part of a door latch assembly in accordance with the present invention;

Figure 4 is a view on the line 4-4 of Figure 3; and

Figure 5 is a view in the direction of the arrow 5 in Figure 3.

Referring to Figures 2 and 5, a latching mechanism for the door 44 of a motor vehicle includes a door latch cam 1 with its latching pawl 2. The latching pawl is operated both by way of a lever 35 which is connected to a handle on the outside of the door and by an additional lever which is connected to a handle on the inside of the door 44.

Referring particularly to Figure 3, lever 35 is pivotally mounted on the lock assembly and is connected to a first flat slide or elongate bar-like member 37 which lies in parallel against a second flat slide 38. Each of the slides has an opening therein

and, when the openings are aligned, a pin 40 can be introduced into the openings to connect the two slides together. When that occurs, operation of the lever 35 is transmitted to the slide 38 which brings about operation of the latching pawl 2 of the latching mechanism. However, when the pin 40 is removed from the openings, relative movement can take place between slides 37, 38 and, in this way, the handle on the outside of the door is inoperative because movement of the handle transmitted to the lever 35 is not transmitted to the pawl via the slide 38. The pin 40 is carried on a slidable elongate rack 41 which is engaged by a pinion 42 on the spindle of motor 23. Operation of the motor drives the rack in the direction of its length to introduce the pin into the openings in the slides 37, 38 or to withdraw the pin from the openings in the slides 37, 38. The head 100 of the pin 40 is received within an enclosed slot 101 at one end of the rack 42. The slot 101 is open at one side so that when the pin 41 is engaged with both openings, as shown in Figure 3, operation of the lever 35 will cause slides 37 and 38 to move together in the direction of the arrow and thus the head 100 of the pin moves out of the slot 101 in the direction of the arrow along a track 102. The pin will return to the slot under the bias of springs associated with the latch assembly (not shown).

In a similar manner, a pivoted lever 36 is connected to the handle on the inside of the door and this lever is connected to a

flat slide 46 which lies against a second flat side 47. Openings are provided in these slides and a pin 48 can be introduced into the openings to connect the slides together. The pin 48 is mounted on an elongate rack 49 which is engaged by a pinion 50 on the spindle of an electric drive motor 28. By actuation of the motor, the pin 48 can be introduced into, or withdrawn from, the openings in the slides 46, 47 to connect or to disconnect the lever 36 from the slide 47. The slide 38 and the slide 47 are connected to the same latch pawl 2. Extra rods or levers (not shown) may be present to connect the slides to the latch pawl 2.

Referring now to Figure 1, a switch forming part of the lock on the vehicle door includes a movable member 10 which is moved by the action of turning a key introduced into the lock. Contacts 11, 12 engageable with the member 10 are connected to the positive and negative sides of the vehicle battery, respectively. A further switch mounted inside the vehicle, conveniently on the dash board, has a movable member 16 which is engageable with contacts 17, 18 connected to the positive and negative terminals of the vehicle battery, respectively. The movable member 10 is connected by a connection 20 including a diode 21 to the motor 23 which has a capacitor 22 in series with it. Connection 20 is connected to the motor 28 which also has a capacitor 27 in series with it. Thus, operation of the contact 10 on the switch on the outside of the door brings about operation of both motors 23, 28.

Member 16 of the switch which is within the vehicle is connected through a diode 29 to the motor 23 and its capacitor only.

Connection of member 10 to contact 11 drives the motors from the battery to the positions where the pins 40, 48 are withdrawn from the slides and the handles are disconnected from the latching mechanisms. Connection of member 16 to contact 17 drives motor 23. The connection of the motors to the battery 15 stores charge in the capacitors. Connection of the members 10, 16 to contacts 12, 18, respectively, cause the capacitors to be discharged through the motors to drive them in the opposite direction to introduce the pins into the holes in order to connect the respective slides together. Because the door is unlocked by the discharge of a capacitor, the mechanism requires no power from the vehicle battery for unlocking, so that if electrical connection is broken, e.g in an accident, the doors may still be opened.

It will be appreciated that the two motors of the lock assembly on each door of the vehicle can be operated simultaneously from the two switches.

On leaving a motor vehicle fitted with the above described door locking system, the user turns a key to operate member 10 causing

the two motors on each door to operate to disengage the latching mechanism from both the inside and the outside handles. If a person is in the vehicle and operates the member 16 of the internal switch, the outside handle is disengaged from the latching mechanism but the inside handle remains operative so that the person can leave the vehicle without difficulty.

The apparatus according to the invention is suitable for use both with a direct action latch, where one or both of the handles operates the latch directly, or with an indirect type where the handles are connected by rods or cables to the latch. The apparatus may be integrally provided as part of the latch mechanism or may be present as an add-on accessory with the majority of known types of latch mechanisms requiring little modification.

The invention is not limited to the embodiment shown. For example, the motors may be replaced with a bi-stable solenoid. The circuit may be arranged so that the inside switch is capable of operating both the inside and outside handles. The lock may include a mechanical override, e.g for the driver's door. The apparatus may include only one motor with the two racks being sandwiched about the pinion so that rotation of the pinion causes the racks to be driven in opposing directions.

CLAIMS

1. Door locking apparatus for a motor vehicle comprising an outermost handle operatively connected to the latch mechanism (2) of the door (44), electrically operable drive means (23, 42, 41, 40) for engaging or disengaging the outer handle from the latch mechanism (2), an inside handle operatively connected to the latch mechanism (2) characterised by electrically operable drive means (28, 50, 49, 48) for engaging and disengaging the innermost handle from the latch mechanism (2).
2. Apparatus according to Claim 1 characterised by first electrical switch means (10) operable from outside of the door whereby the user can render both the inside and outside handles operative or inoperative, and further electrical switch means (16) locatable within the vehicle, whereby the outside handle and/or the inside handle can be rendered operative or inoperative.
3. Apparatus according to Claim 2 characterised in that the further electrical switch means (16) are arranged whereby the outside handle can be rendered operative or inoperative,

while the inside handle remains operative.

4. Apparatus according to any preceding Claim characterised by two pairs of links (37, 38; 46, 47), one link of each pair (37, 46) being operatively connected to one of the handles, the other link (47, 38) of each pair being operatively connected to the latch (2); and a member (40, 48) moveable into and out of engagement with the pairs of links to connect the links of each pair together or to leave them free for relative movement.
5. Apparatus according to Claim 4 characterised in that each pair of links (37, 38; 46, 47) comprises elongate bar-like members disposed in parallel side-by-side and each displaceable in the direction of its length, openings extending transversely across each link, and a pin (40, 48) arranged to be introduced into openings when aligned in each pair of the links to connect the links together or to be withdrawn from one or both of the openings to leave the links free for relative movement, the pin (40, 48) being located at one end of a rack means (41, 49) arranged to be driven by a motor (23, 28) the pin being present within an enclosed slot (101) which is open at one side, whereby when the pin (40, 48) is engaged with both links and those links are displaced in the direction of their length, the pin is

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moved out of the rack to move with the links.

6. An assembly to be fitted to a latch assembly of the door of a motor vehicle, comprising a casing, a first electric motor (23) having a pinion (42) operatively connected to a rack (41), a pin (40) within an open sided enclosed slot (101) at one end of the rack, a pair of parallel elongate bar-like members (37, 38) including openings therein to receive the pin (40), one member to be connected to a pivotal lever (35) of the latch assembly connected to the outermost door handle, the other member to be connected to a latch pawl (2) of the latch assembly, characterised by a second motor (28), pinion (50), rack (49), pin (48) and second pair of parallel elongate bar-like members (46, 47), one (46) of the second pair of members to be connectable to a lever (36) of the latch assembly connected to the inside handle, the other member (47) to be connected to the latch pawl (2).

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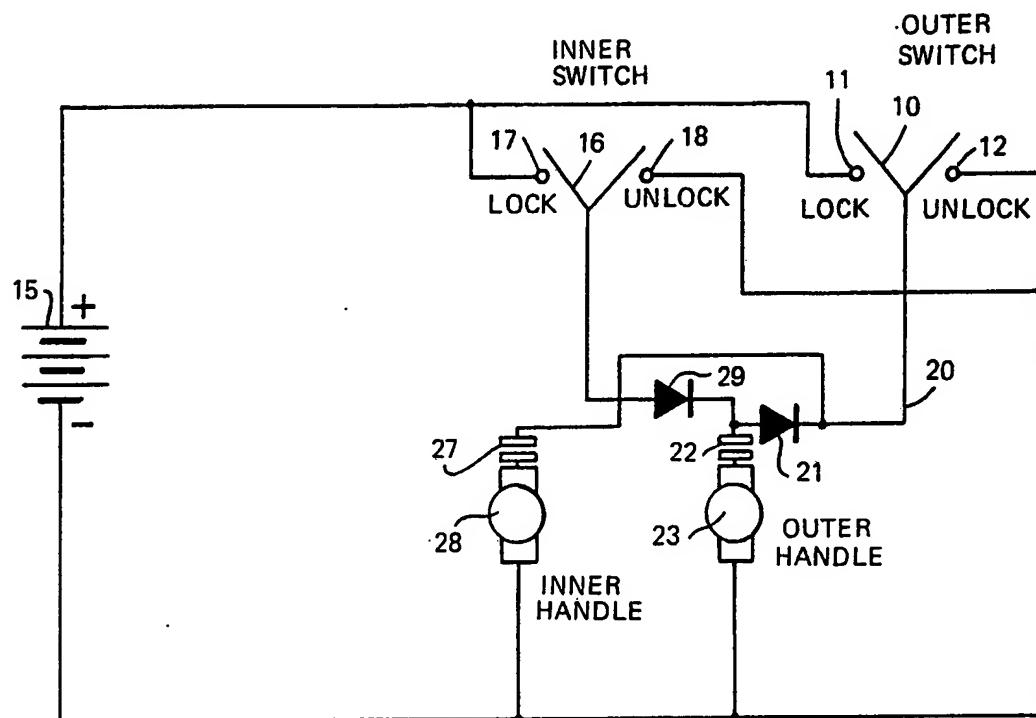


FIG.1

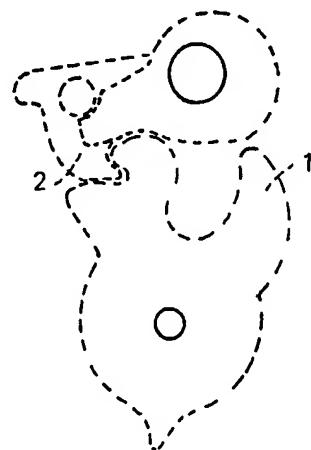


FIG.2

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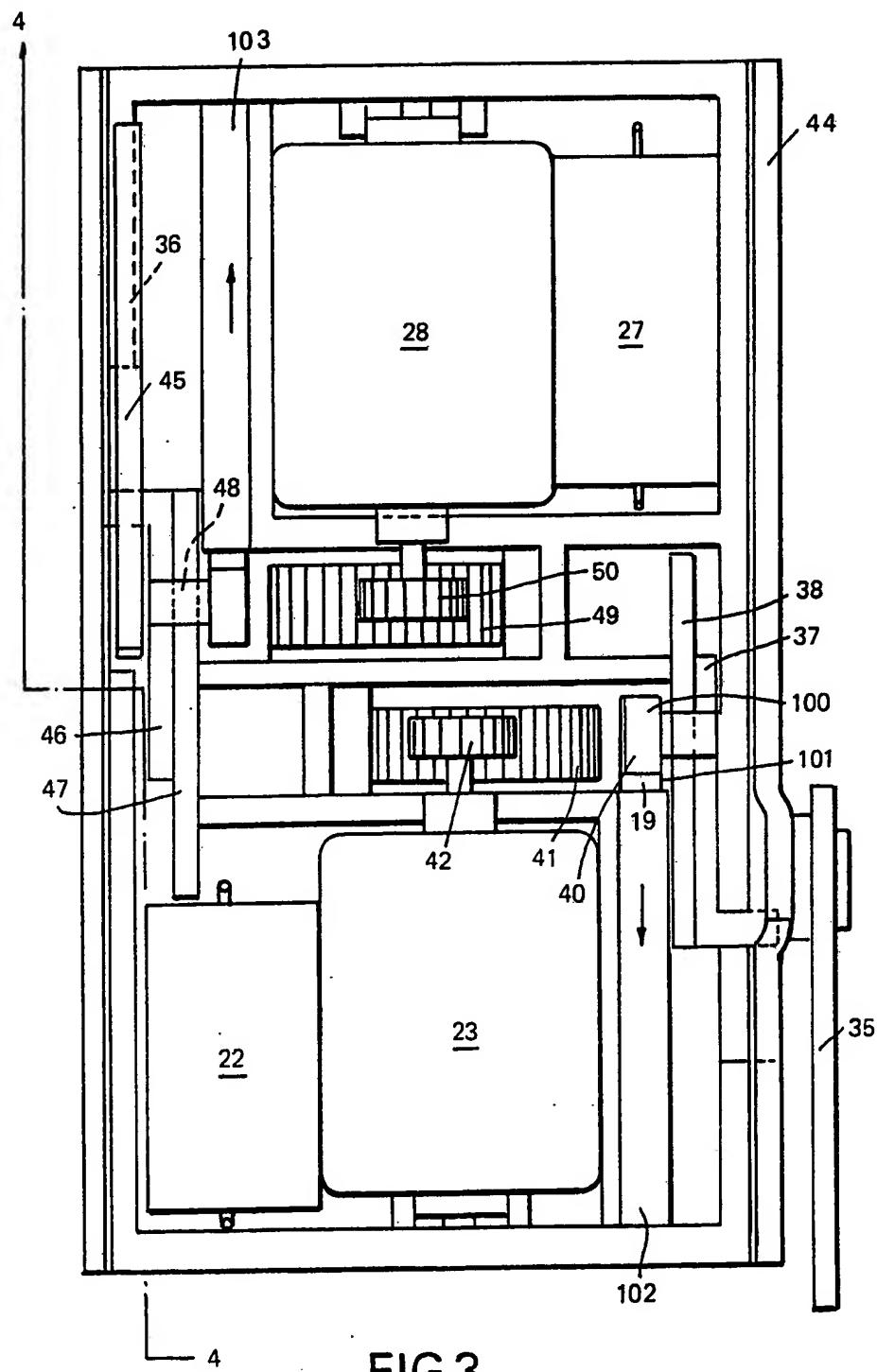


FIG.3

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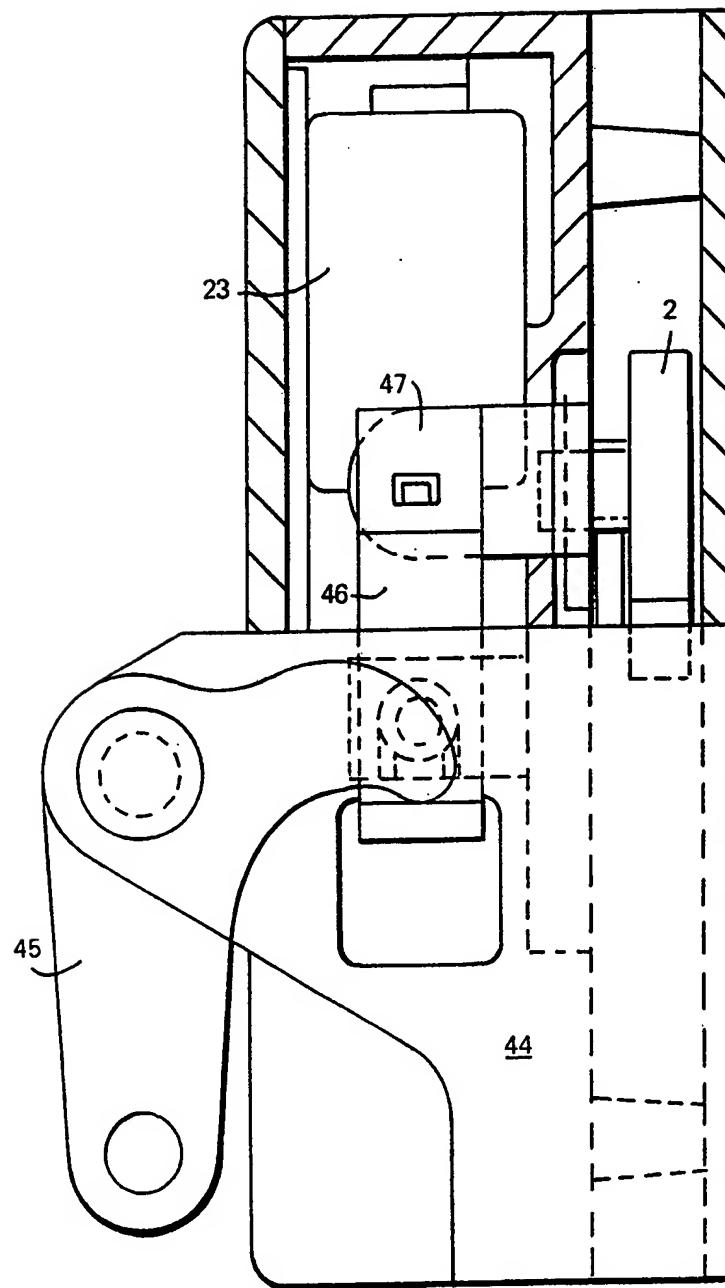


FIG.4

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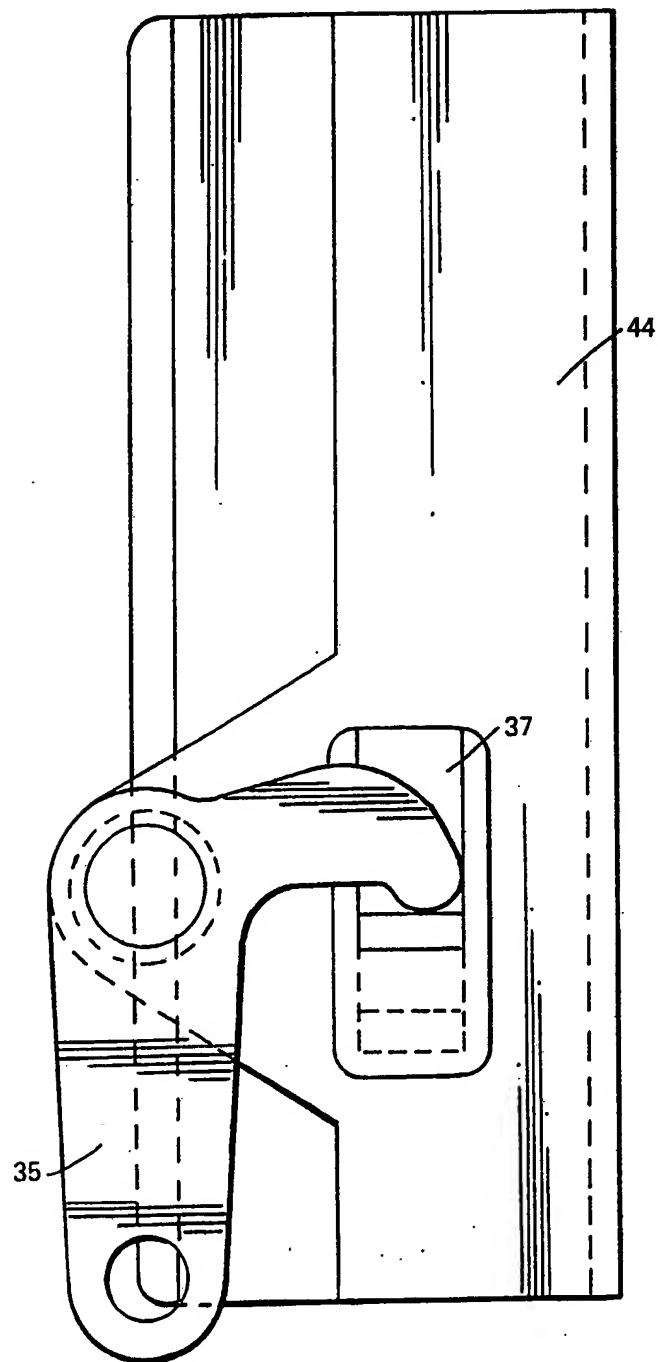


FIG.5

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## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 89/01387

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)<sup>6</sup>

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 E05B65/20 ; E05B47/00

## II. FIELDS SEARCHED

Minimum Documentation Searched<sup>7</sup>

Classification System	Classification Symbols
Int.Cl. 5	E05B

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched<sup>8</sup>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup>

Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	EP,A,0142319 (SECURITY & AUTO ELECTRICAL DESIGN) 22 May 1985 see the whole document (cited in the application) ---	1
Y	DE,A,3625833 (BMW) 11 February 1988 see the whole document ---	1
A	US,A,4334704 (MITSUI) 15 June 1982 see the whole document ---	1

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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

1 05 APRIL 1990

Date of Mailing of this International Search Report

08.05.90

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

MISS D. S. NOWALCZYK

ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.

PCT/GB 89/01387

SA 32861

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26/04/90

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0142319	22-05-85	CA-A- 1254397 JP-A- 60238584 US-A- 4617812	23-05-89 27-11-85 21-10-86
DE-A-3625833	11-02-88	None	
US-A-4334704	15-06-82	None	

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